

We claim:

1. A process for fractionating a crude C₄ fraction comprising butanes, butenes, 1,3-butadiene and small amounts of other hydrocarbons including C₄-acetylenes, 1,2-butadiene and C₅-hydrocarbons by extractive distillation using a selective solvent, wherein the crude C₄ fraction (1) is fed into the middle region of a first extractive distillation column (K I) and the selective solvent (2) is fed into the column at a point above that at which the crude C₄ fraction (1) is introduced and a gaseous side stream (3) which comprises the C₄-acetylenes together with 1,3-butadiene, 1,2-butadiene, C₅-hydrocarbons and selective solvent and in which the concentration of the C₄-acetylenes is below the spontaneous decomposition limit is taken off from the first extractive distillation column (K I) at a point below the feed point for the crude C₄ fraction (1) and an overhead stream (5) comprising the components of the crude C₄ fraction which are less soluble than the C₄-acetylenes in the selective solvent is taken off from the top of the first extractive distillation column.
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2. A process as claimed in claim 1, wherein the gaseous side stream (3) is fed to a first side column (SK I) in which it is separated into an overhead stream (6) which comprises the C₄-acetylenes and is condensed in a condenser at the top of the first side column (SK I) and part of it is returned as runback to the first side column (SK I) while the remainder is taken off and a bottom stream (7) which comprises the selective solvent and is returned to the first extractive distillation column (K I).
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3. A process as claimed in claim 1 or 2, wherein a bottom stream (4) is taken off from the first extractive distillation column (K I) and is cooled by indirect heat exchange with the crude C₄ fraction (1), condensed in a condenser and returned as stream (2) to the first extractive distillation column (K I).
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4. A process as claimed in any of claims 1 to 3, wherein liquid or a substream of the liquid is taken off from the first extractive distillation column (K I) at a theoretical plate which is one or more theoretical plates below the point at which the gaseous side stream (3) is taken off, the liquid is heated and/or vaporized by indirect heat exchange with the bottom stream (4) from the
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- first extractive distillation column (K I) and is returned to the first extractive distillation column (K I) on the same theoretical plate or above this point, with the theoretical plate from which the liquid or liquid substream is taken off being chosen so that the energy requirement for the first extractive distillation column (K I) is minimized.
5. A process as claimed in any of claims 1 to 4, wherein the overhead stream (5) from the first extractive distillation column (K I) is condensed in a condenser at the top of the first extractive distillation column (K I) and part of it is returned as runback while the remainder of the condensed overhead stream (8) is fed to a second extractive distillation column (K II) in which it is separated into raffinate 1 and crude 1,3-butadiene.
10. 6. A process as claimed in claim 5, wherein a partial condensation is carried out in the condenser at the top of the first extractive distillation column (K I) and the condensed portion of the overhead stream (5) from the first extractive distillation column (K I) is used as runback while the gaseous portion of it is fed to the second extractive distillation column (K II).
15. 7. A process as claimed in claim 5 or 6, wherein an overhead stream (9) is taken off from the second extractive distillation column (K II), condensed in a condenser and part of it is returned as runback to the second extractive distillation column (K II) while the remainder is taken off as raffinate 1, and a side stream (10) is taken off from the second extractive distillation column (K II) below the feed point for the stream (8) and this is preferably fed to a second side column (SK II) in which it is separated into an overhead stream which is condensed and part of it is returned as runback to the second side column (SK II) while the remainder is taken off as crude 1,3-butadiene stream and a bottom stream (12) which comprises the selective solvent and is returned to the second extractive distillation column (K II).
20. 8. A process as claimed in any of claims 5 to 7, wherein liquid or a substream of the liquid is taken off from the second extractive distillation column (K II) at a theoretical plate which is one or more theoretical plates below the side offtake (10), the liquid is heated and/or vaporized by indirect heat exchange with the bottom stream (13) from the second extractive distillation column (K II) and is returned to the second extractive distillation column
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(K II) on the same theoretical plate or above this point, with the theoretical plate from which the liquid or liquid substream is taken off being chosen so that the energy requirement for the second extractive distillation column (K II) is minimized.